

Notice of Allowability

Application No.

10/622,976

Examiner

Kandasamy Thangavelu

Applicant(s)

COLVIN ET AL.

Art Unit

2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to July 27, 2005 and October 17, 2005.
2. ☒ The allowed claim(s) is/are 1,5-9,11 and 15-19.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 7/27/05
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Introduction

1. This communication is in response to the Applicant's Request for Continued Examination dated July 27, 2005 and amendment under 37 CFR 1.312 dated October 17, 2005. Claims 1, 5, 11 and 15 were amended. Claims 1, 5-9, 11 and 15-19 of the application are pending.

Information Disclosure Statement

2. Acknowledgment is made of the information disclosure statements filed on July 27, 2005 together with a list of patents and papers and copies of the papers. The patents and papers have been considered.

Examiner's Amendment

3. Authorization for this examiner's amendment was given in two telephone conversations by Mr. Alton Hornsby III on December 28, 2005.

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to the applicants, an amendment may be filed as provided by 37 CFR

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1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

4. In the Claims:

In amended Claim 15, Lines 1-2:

“The computer-readable medium of claim 11, the accumulated value (AccumValue) associated with each center location is derived”

has been changed to

-- The computer-readable medium having computer executable instructions of claim 11, wherein the accumulated value (AccumValue) associated with each center location is derived --.

In Claim 16, Lines 1-2:

“The computer-readable medium of claim 11, wherein selecting target locations includes”

has been changed to

-- The computer-readable medium having computer executable instructions of claim 11, wherein selecting target locations includes --.

In Claim 17, Lines 1-2:

“The computer-readable medium of claim 16, wherein selecting target locations includes”

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has been changed to

-- The computer-readable medium having computer executable instructions of claim 16,
wherein selecting target locations includes --.

In Claim 18, Lines 1-2:

“The computer-readable medium of claim 11, wherein selecting target locations
includes”

has been changed to

-- The computer-readable medium having computer executable instructions of claim 11,
wherein selecting target locations includes --.

In Claim 19, Lines 1-2:

“The computer-readable medium of claim 11, wherein selecting target locations further
comprises”

has been changed to

-- The computer-readable medium having computer executable instructions of claim 11,
wherein selecting target locations further comprises --.

Reasons for Allowance

5. Claims 1, 5-9, 11, and 15-19 of the application are allowed over prior art of record.

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6. The following is an Examiner's statement of reasons for the indication of allowable subject matter:

The closest prior art of record shows:

(1) a two-stage method for determining well locations in a 3-D reservoir model while satisfying constraints including minimum interwell spacing, minimum well length, distance from offshore platform etc.; the first stage solves the well spacing problem as a binary integer programming problem; the second stage considers selected vertical completions to determine well trajectories that connect the maximum reservoir proxy values; the parameters optimized are values such as porosity, net pay, permeability; the values for each volumetric cell (voxel) of the 3-D reservoir model are determined; then the reservoir quality is calculated by summing the proxy values within an estimated draining radius of the prospective well of the given voxel; the reservoir quality is calculated by first trimming the proxy measurement values below a chosen cutoff value; the range of cells that could be drained from a current cell location is determined by multiplying the draining radius by an aspect ration in each direction; in the first stage, the 3-D reservoir quality volume is used to generate a 2D quality map, by setting the quality volume for each cell to the maximum quality in the corresponding column of the cells in the 3-D volume; the binary programming formulation maximizes the overall quality of the selected well locations against the cost of drilling the wells (**Cullick et al.**, U.S. Patent 6,549,879);

(2) a neural network method for delineating hydrocarbon accumulations from seismic data; the neural network method uses a conceptual sliding window to distinguish accumulations; the sliding window distinguishes areas characteristic of hydrocarbons from areas without characteristics of hydrocarbons; the method applies the neural network to a portion of the data to

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create scores indicative of the presence or absence of objects within a given area; creating training sets and test sets using the data related to sub-areas which scored high and low relative to remaining sub-areas; uses the neural network and the collected seismic data to determine one or more optimal well locations (**Bush**, U. S. Patent Application 2003/0204311); and

(3) a method of three-dimensional seismic reservoir geometry characterization; the method automatically generates a finite element grid around a sloping fault; the method combines this finite element grid with the remaining finite element grid to form a hybrid grid that allows efficient solution of flow equations for the reservoir; the method triangulates the faces around the fault and assembles a hybrid grid which represents a three-dimensional model of the reservoir; (**Kocberber et al.**, U. S. Patent 5,740,342).

Additional state of the art reviewed and considered by the Examiner is found in U.S. Patent 5,757,663; U.S. Patent 6,006,832; U.S. Patent 6,315,054; U.S. Patent Application 2002/0165671; U.S. Patent Application 2003/0220739; U.S. Patent Application 2003/0043693; U.S. Patent Application 2002/0120429; U.S. Patent Application 2002/0013687; U.S. Patent Application 2002/0067373; U.S. Patent Application 2003/0023383.

None of these references taken either alone or in combination with the prior art of record disclose a computer implemented method and a computer-readable medium having computer-executable instructions for reservoir targeting, specifically including:

(Claims 1 and 11) “determining a set of contiguous cells for at least one selected X and Y location in the schematic model, wherein the set of contiguous cells is determined by moving a

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window of a plurality of cells to select a window of a plurality of cells that has a maximum value of a sum of values of an attribute of interest, wherein the sum is taken over the cells in the selected window, the plurality of cells having the maximum value of the sum being the most desirable cells for the at least one selected X and Y location;

recording a center of location of the most desirable cells along with an area of the cells and the maximum value of the sum of values of the attribute of interest for the at least one selected X and Y location in a first matrix, wherein the first matrix is a two dimensional matrix; and

for each cell in the first matrix, taking each cell as a selected cell, calculating a distance weighted sum of values in the first matrix of all the cells within a multiple of a spacing radius from a center point of the selected cell, wherein a weight is selected to give more weight to cells located closer to the selected cell and less weight to cells located further from the selected cell and entering the distance weighted sum in a second matrix as an accumulated value for the selected cell”.

7. Any comments considered necessary by applicants must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance.”

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kandasamy Thangavelu whose telephone number is


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571-272-3717. The examiner can normally be reached on Monday through Friday from 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard, can be reached on 571-272-3749. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to TC 2100 Group receptionist: 571-272-2100.

K. Thangavelu
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December 28, 2005


Paul P. Rodriguez 1/6/06
Pat. Ex. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100
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